DOCUMENT RESUME

ED 457 524 CS 217 727

AUTHOR	Ngeow, Karen; Kong, Yoon-San
TITLE	Learning To Learn: Preparing Teachers and Students for Problem-Based Learning. ERIC Digest.
INSTITUTION	ERIC Clearinghouse on Reading, English, and Communication, Bloomington, IN.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
REPORT NO	EDO-CS-01-04
PUB DATE	2001-10-00
NOTE	4p.; ERIC Digest D163.
CONTRACT	ED-99-CO-0028
AVAILABLE FROM	ERIC Clearinghouse on Reading, English, and Communication, Indiana University, 2805 E. 10th Street, Suite 140, Bloomington, IN 47408-2698. Tel: 800-759-4723 (Toll Free). For full text: http://eric.indiana.edu.
PUB TYPE	ERIC Publications (071) -- ERIC Digests in Full Text (073)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Active Learning; *Cooperative Learning; *Critical Thinking; Higher Education; *Problem Based Learning; *Scaffolding (Teaching Technique); Secondary Education; *Thinking Skills
IDENTIFIERS	ERIC Digests; Self Direction

ABSTRACT

Problem-based learning (PBL) is an educational approach that challenges students to "learn to learn"--students work cooperatively in groups to seek solutions to real-world problems and, more importantly, to develop skills to become self-directed learners. PBL is unique in its integral emphasis on core content along with problem solving. Within the context of reading in the PBL classroom, learning thus becomes much more than the process of mere knowledge seeking. Students develop critical thinking abilities by constantly relating what they read to what they want to do with the information. This digest discusses some of the challenges in learning that students face, and identifies Web resources that teachers can use to support student learning. The digest considers scaffolding, cooperative learning skills, inquiry skills, reflection skills, and assessment, all within the context of "learning to learn." (NKA)

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ED 457 524

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D163
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October 2001

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http://eric.indiana.edu D163 EDO-CS-01-04

Learning to Learn: Preparing Teachers and Students for Problem-Based Learning

by Karen Ngeow and Yoon-San Kong

Problem-based learning (PBL) is an educational approach that challenges students to "learn to learn". Students work cooperatively in groups to seek solutions to real-world problems and more importantly, to develop skills to become self-directed learners. Here, the goal of problem-based learning is viewed as learning for capability rather than learning for the sake of acquiring knowledge. PBL is unique in its integral emphasis on core content along with problem solving (Gallagher, 1997). Within the context of reading in the PBL classroom, learning thus becomes much more than the process of mere knowledge seeking. Students develop critical thinking abilities by constantly relating what they read to what they want to do with the information. They question the writer's assumptions and analyze information presented, all within the context of finding answers to "What can I do with this information?" and "What does understanding this mean to me?" This digest discusses some of the challenges in learning that students face, and identifies web resources that teachers can use to support student learning.

Challenges in PBL implementation

PBL requires students to take on active learning strategies and adopt a self-directed learning disposition. Some students find it difficult to cope when asked to transform into active critical thinkers. PBL teachers may also face difficulty as they prepare to facilitate discussion, provide coaching, challenge student thinking and manage group work. Below are some challenges for PBL classrooms.

Limited experience in group work management. Group work is integral to PBL and students need to learn how to make optimal use of their time and resources while working in groups. Functioning effectively in groups involves knowing how to organize the work, distribute responsibility, break up complex tasks, and provide useful feedback on work that is done. Teachers can contribute by helping students better understand the merits of group work.

Lack of familiarity with inquiry learning. When faced with problem tasks, students often find it difficult to identify the critical issues and to generate coherent research designs. They are often unclear about how they can relate what they are currently reading to what they already know. They are also unfamiliar with different stages of the inquiry process, such as generating hypotheses, providing logical arguments, and transforming data into a product. When students have an appropriate learning context and the need to seek the necessary information, they also see how things finally "come together". This is an aspect of critical reading that can be promoted within the framework of problem-based learning.

Inadequate feedback on learning and assessment. Giving feedback to students is integral to improving student learning. Barron et al. (1998) suggest that teachers can better guide and monitor projects by incorporating formative self-reflections by students, by creating a classroom culture that supports frequent feedback and assessment, and by finding ways for students to compare their work with others. Teachers can make students take their work seriously by incorporating opportunities that involve external audiences in assessing students' performance.

Scaffolding for PBL success

In the model of cognitive apprenticeship, developed by Collins, Brown and Newman (1987), scaffolding is described as a means of coaching students to the extent that they can perform intellectual tasks on their own. Success with PBL largely depends on whether students have been sufficiently prepared to take on certain new roles, such as those of inquiry seekers and collaborative team players in the classroom (Boud & Feletti, 1997). In a PBL classroom, for example, the teacher gauges the difference between what activities students can do on their own and what they need to learn to do to solve the problem. Then the teacher designs activities which offer just enough of a scaffold for students to overcome this gap of knowledge and skills (Greening, 1998). Effective scaffolding includes activities that help students develop the right mindset, engage students with the problem, divide activities into manageable tasks, and direct students' attention to essential aspects of the learning goals. The effectiveness of PBL depends to a large degree on the scaffolding provided by teachers to students.

Learning to learn: Cooperative learning skills

Central to the effectiveness of PBL is the ability of students to work together to solve problems (Peterson, 1997). Teachers can encourage more beneficial and meaningful group work by prompting students to pool talents and resources and by guiding them to resolve conflicts while working together. Relevant web resources to enhance this skill building include:

- Essential Elements of Cooperative Learning in the Classroom
  http://www.ed.gov/databases/ERIC_Digests/ed370881.html
- Cooperative and Collaborative Learning: Implementation
  http://www.thirteen.org/wnetschool/concept2class/month5/implementation.html
- Collaborative Learning: Why Groups Fail
  http://www.wcer.wisc.edu/nise/cl1/CL/moreinfo/MI3J.htm

Learning to learn: Inquiry skills

In PBL, students must seek and evaluate the information they acquire related to the problem they are given to solve. Activities that involve inquiry learning include problem framing, data gathering, divergent thinking or idea generation, evaluating alternatives, and applying a solution to the problem (Hmelo & Ferrari, 1997). Web resources on inquiry activities are:

- Critical Thinking in Reading
  http://www.yorku.ca/cdc/lsp/read/read4.htm
- A Questioning Toolkit
  http://fromnowon.org/nov97/toolkit.html
- Higher-Order Thinking Strategies for the Classroom
  http://members.aol.com/MattT10574/HigherOrderLiteracy.htm
- Promoting Thinking in Classroom Learning: A Self-Assessment Scale for Teachers (refer to page 20)
  http://www.breakthroughs.co.nz/bt/Obrien.pdf

Learning to learn: Reflection skills

Reflection involves focused thinking about learning during the learning process. However, students often get caught up in completing a task and do not take time to reflect. Students learn from two kinds of reflection activities. The first focuses on the content, with students asking questions such as "What do I know now, and how can I use this information to meet the project's goal?" The second is reflection on the learning process, wherein is asked such questions as "How am I doing as a learner in this environment - as a self directed learner, as a problem solver, and as a collaborator? What are my strengths and weaknesses? How can I improve?" Relevant web resources to enhance student reflection include:

- Developing Metacognition
  http://www.ed.gov/databases/ERIC_Digests/ed327218.html
- Metacognition
  http://chiron.valdosta.edu/whuitt/col/cogsys/metacogn.html

Learning to learn: Assessment

One problem in PBL is that while students are constantly encouraged to be engaged in the learning process, assessment of student learning is often focused instead on the final learning product. PBL teachers need to better understand meaningful ways of assessing student work to motivate learning. The following web resources provide information that clarifies a variety of topics related to assessment for PBL:

- Energizing Teacher Education and Professional Development with Problem-Based Learning
  http://www.ascd.org/readingroom/books/levin01book.html
- Assessing Student Work with Project-Based Learning
  http://pblmm.k12.ca.us/PBLGuide/AssessPBL.html
- Project Based Learning: Involving Students in Checklist Creation (Also, check out the link to the Ontario Teachers' Staff Room for a rubric creation resource)
  http://www.4teachers.org/projectbased/students.shtml

Conclusion

PBL teachers constantly face challenges of encouraging students to go beyond the given information, to reflect on learning, and to actively consider how their knowledge might apply in novel contexts. Students are encouraged to constantly discover and try new ways of learning. To facilitate these goals, teachers and students need to be provided with appropriate and accessible pedagogical tools and support.

As students develop more self-directed learning strategies, teachers can provide less scaffolding support. Below are some resources that can help teachers gain a better understanding of PBL and provide ways of supporting student learning at different levels.

- PBL Projects by the ERIC Clearinghouse on Educational Management, complete with Instructor and Student Editions
  http://eric.uoregon.edu/publications/pub_pbl.html
- How to Use Problem-Based Learning in the Classroom
  http://www.ascd.org/readingroom/books/delisle97book.html
- Problem Based Learning in Language Instruction: A Constructivist Method
  http://www.indiana.edu/~eric_rec/ieo/digests/d132.html
- Adelaide University: LEAP into Problem-Based Learning
  http://www.acue.adelaide.edu.au/leap/leapinto/pbl/

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Digest #163 is EDO-CS-01-04 and was published in October 2001 by the ERIC Clearinghouse on Reading, English and Communication, 2805 E 10th Street, Bloomington, IN 47408-2698, Telephone (812) 855-5847 or (800) 759-4723. ERIC Digests are in the public domain and may be freely reproduced. Additional copies may be ordered by contacting the ERIC Document Reproduction Service at (800) 443-3742.
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